

REMARKS:

In the Office Action dated July 18, 2007, the Declaration was stated to be defective. A substitute Declaration has been prepared and is being circulated among the inventors for signature, but the signed Declaration has not yet been received by Applicants' representative. The signed substitute Declaration will be immediately submitted upon receipt thereof by Applicants' representative.

Claims 14, 18, 19, 21 and 24-26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ripley et al. in view of Duong-Van. Claims 15-17 and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ripley et al. and Duong-Van, further in view of Li et al.

These rejections are respectfully traversed for the following reasons.

In substantiating the rejection of independent claim 14 based on Ripley et al. and Duong-Van, the Examiner cited the passage in Ripley et al. at column 9, lines 48-58, and the Examiner stated that the statements in that passage are being interpreted to mean that a feature vector (i.e., the position in space and distance between clusters) is calculated, and is compared to a threshold (i.e., the predetermined distance) in order to help assign features to specific clusters. The Examiner acknowledged that the Ripley et al. reference does not disclose the use of wavelet transforms, and relied on Duong-Van as providing such a teaching. The Examiner stated the Duong-Van reference, in a similar field of endeavor, senses cardiac signals and performs wavelet transformations on the sensed data, and analyzes the resultant wavelet transforms in order to classify the data as a particular cardiac event. The Examiner characterized the Duong-Van reference as providing a teaching that wavelet transforms can be applied to electrical cardiac signals in order to aid in analysis and classification of the cardiac signal. The Examiner concluded it would have been obvious to a person of ordinary skill to modify the Ripley et al. reference in accordance with the teachings of Duong-Van, since Duong-Van teaches that cardiac signal classification/characterization can be enhanced by the use of wavelet transforms.

In substantiation of Applicants' traversal of this rejection, Applicants first note that the Examiner's conclusions are at odds with the conclusions reached during earlier PCT examination upon review of the very same references relied upon by the Examiner. In the Written Opinion of the International Searching Authority (which, in PAIR for this application, is among the 46 pages collectively identified as "documents submitted with 371 applications" on January 12, 2005), the Examiner in the International Searching Authority cited the Ripley et al. patent as reference D2 and the Duong-Van patent as reference D6, and characterized those documents as being among documents that represent the general state of the art, and further stated

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed apparatus for analyzing cardiac events detected in electrograms and the claimed heart stimulator. Therefore, the claimed invention is not obvious to a person skilled in the art.

In reaching a different conclusion from that of the International Search Authority, Applicants respectfully submit the Examiner has significantly over-generalized the teachings of the Duong-Van reference, and the manner by which those teachings would be considered and used by persons of ordinary skill in the field of analyzing and classifying cardiac events. It is of course true that the Duong-Van reference discloses subjecting cardiac signals to a wavelet transformation, and then using the attributes or characteristics of the transformed signals to classify cardiac events. According to the teachings of Duong-Van, however, this classification is an end result unto itself. In other words, Duong-Van clearly teach that although wavelet transformation can assist in classifying cardiac signals, once the wavelet transformation has been done and transformed signals have been obtained, the analysis or classification can and should proceed based on the transformed signals themselves.

The Ripley et al. reference proceeds on the basis of a different type of classification procedure, namely the use of clusters, wherein a QRS complex in question is assigned to a particular cluster, as long as certain preconditions

are satisfied. There is no teaching or suggestion in the Ripley et al. reference that any type of transformation can or should be made to the QRS complex in question; it is simply assigned to a particular cluster in its original form, and there is no indication or suggestion in the Ripley et al. reference that using the QRS complex in its original form (i.e., without subjecting the signal to any type of transformation) is unsatisfactory for the classification purposes intended in Ripley et al.

Since both the Ripley et al. and Duong-Van references use the respective techniques therein to classify incoming cardiac signals, a person of ordinary skill in that field of endeavor, without having had the benefit of first reading Applicants' disclosure, would assume that these different classification techniques are each individually satisfactory for achieving the desired classification results. Applicants respectfully disagree with the Examiner's conclusion that the Duong-Van reference provides some sort of teaching that wavelet transformation is generally applicable to enhance other types of classification procedures. The clear teaching of the Duong-Van reference is that wavelet transformation is itself to be used for classification, and there is no "enhancement" that is necessary, because Duong-Van clearly teaches that analyzing the wavelet transformed signals provides an accurate technique for cardiac event classification.

Only the present Applicants have had the insight to realize that even though a wavelet transformed signal can be used by itself as a satisfactory basis for cardiac event classification, the technique of cardiac event classification by clustering can be improved by using a wavelet transformed signal in place of the conventionally-used original cardiac signal. Applicants respectfully submit it is only by hindsight, after reading Applicants' disclosure, which the Examiner has seen a benefit to using wavelet transformed signals in the context of a cluster analysis. Clearly such an insight did not occur to the inventors in either of the Duong-Van or Ripley et al. references. The respective disclosures of those references proceed along parallel and non-intersecting paths, and the respective analysis techniques in those two references are clearly described therein as being entirely satisfactory for

achieving a classification result. Since both references achieve a satisfactory classification result, a person of ordinary skill in the field of cardiac event classification, upon reading those two references, would assume that either technique could be used with satisfactory results, and there is no reason disclosed in those references to nix the two techniques. In fact, in the context of cardiac event detection that takes place within an implanted device, wherein processing capacity and battery drain are always primary considerations, a person of ordinary skill in the field of cardiac event classification, without reaching Applicants' disclosure, would most likely assume that, since both the Duong-Van technique and the Ripley et al. technique produce (according to those respective references) a satisfactory classification result, it would be redundant to make use of both analysis techniques, with no additional classification refinement being obtained. Therefore, a person of ordinary skill in the field of cardiac event classification, at least for use in implanted devices, would be dissuaded from modifying the Ripley et al. technique in accordance with the teachings of Duong-Van, because this would only increase the processing burden on the microprocessor, and thus would also increase the battery drain, both of which are negative influences in the design of an implanted device. Only the present Applicants have had the insight to realize that the advantage that can be obtained by first subjecting the incoming cardiac signals to a wavelet transformation, and only thereafter employing a cluster analysis technique on the transformed signals outweighs or has the potential to outweigh the aforementioned disadvantages of the extra computing that is necessary therefor.

Applicants therefore submit that neither of independent claims 14 or 26 would have been obvious to a person of ordinary skill in the field of classifying cardiac events and/or in the field of designing cardiac stimulators, under the provisions of 35 U.S.C. §103(a), based on the teachings of Ripley et al. and Duong-Van. Claims 18, 19, 21, 24 and 25 add further structure to the non-obvious combination of claim 14, and therefore would not have been obvious for the same reasons discussed above in connection with claim 14.

Claim 14 has been editorially amended to include the generation of an output signal that identifies the particular cluster to which the cardiac event has been assigned. The reason for amending claim 14 in this manner has nothing to do with the prior art rejection, but is due to the guidelines that have been enacted with the Patent and Trademark Office requiring that claimed subject matter, in order to constitute statutory subject matter under 35 U.S.C. §101, must include a recitation of a tangible, concrete result. Even though claim 14 was not rejected under 35 U.S.C. §101, it has been the experience of the undersigned representative of the Applicants that, upon a quality control review, allowed applications that contain claims that do not satisfy the aforementioned guidelines will be returned to the Examiner for further action. In order to avoid this possibility in the present application, claim 14 has been amended as described above.

For similar reasons, independent claim 26 has been editorially amended, since the preferred term in place of “adapted” (which has been accepted for decades) now seems to be “configured” according to Patent and Trademark Office guidelines. Claim 26 also has been amended to conform to recently adopted guidelines regarding the description of function in an apparatus claim.

As to the rejection of claims 15-17 and 23 based on Ripley et al., Duong-Van and Li et al., the above discussion relating to the Ripley et al. and Duong-Van combination is equally relevant. Even if the Ripley et al./ Duong-Van combination were further modified in accordance with the teachings of Li et al., the subject matter of claims 15-17 and 23 still would not result.

All claims of the application are therefore submitted to be in condition for allowance and early reconsideration of the application is respectfully requested.

The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to account No. 501519.

Submitted by,

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